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A handwritten signature in black ink, appearing to read 'K. Terajima', is written over a horizontal line.

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[Title of the Invention] DEVICE MONITORING APPARATUS

[Claims]

[Claim 1]

5 A device monitoring apparatus capable of acquiring information by communication from a device to be monitored and communicating with a management apparatus, characterized in that the device monitoring apparatus comprises:

10 a processing means for, when updated modules are received from the management apparatus, updating modules in operation to the received modules;

 an information collecting means that collects version information when a version information
15 acquisition request has been received from the management apparatus; and

 a returning means that sends the version information collected by said information collecting means to the management apparatus. [Detailed Description
20 of the Invention]

[0001]

[Field of the Invention]

 The present invention relates to a device monitoring apparatus which monitors at least one device
25 (in particular, an office printer such as a multi-function copying machine), collects information on the device, and sends the information to a management

server (host), and to a device remote monitoring system which manages at least one device monitoring apparatus and collects information on the monitoring apparatus.

[0002]

5 [Conventional Art]

Conventionally, there has been a system which is constructed such that an apparatus (host) having an information processing function and monitoring apparatuses communicate with each other via a
10 communication medium, and which remotely monitors the status of an apparatus such as a device via the monitoring apparatus. For this type of remote monitoring system, there has been a method in which modules in a monitoring apparatus which is subject to
15 update (version update) and installed at a remote location are remotely updated. In this case, the host and the monitoring apparatus which is subject to update establish a connection to each other, update data is transferred without fail within the connection, then
20 updated modules are validated, and then the connection is disconnected.

[0003]

It should be noted that various proposals has been made as examples of the above described prior art
25 (refer to Patent Document 1, for example).

[0004]

[Patent Document 1] Japanese Laid-Open Patent

Publication (Kokai) No. 2000-322244

[0005]

[Problems to be Solved by the Invention]

The conventional remote monitoring system
5 described above, however, is encountered with problems
as below. In the remote monitoring system, since the
host manages a plurality of monitoring apparatuses,
there has been a very complicated and time-consuming
operation of establishing a connection for each
10 monitoring apparatus which is subject to update for
performing update. Therefore, smooth update is
difficult according to the prior art.

[0006]

In view of the above, it is therefore an object of
15 the present invention to provide a device monitoring
apparatus which makes it possible to efficiently update
modules in the monitoring apparatus by remote control
from a management apparatus, or the like.

[0007]

20 [Means for Solving the Problems]

To attain the above object, the present invention
is a device monitoring apparatus capable of acquiring
information by communication from a device to be
monitored and communicating with a management apparatus,
25 characterized in that the device monitoring apparatus
comprises: a processing means for, when updated modules
are received from the management apparatus, updating

modules in operation to the received modules; an information collecting means that collects version information when a version information acquisition request has been received from the management apparatus; and a returning means that sends the version information collected by the information collecting means to the management apparatus.

[0008]

[Embodiments of the Invention]

10 The present invention will now be described in detail with reference to the accompanying drawings showing a preferred embodiment thereof.

[0009]

FIG. 1 is a schematic view showing an example of the overall construction of a device remote monitoring system according to an embodiment of the present invention. The device remote monitoring system is comprised of a device monitoring apparatus (abbreviated "monitoring apparatus" hereinafter) 1, a terminal side management server 2, devices 3, 4, and 5, a center side management server 6, a center side client PC 7, a communication line 8, and a LAN (Local Area Network) 9. Reference numeral 10 denotes a communication protocol.

[0010]

25 In the device remote monitoring system, the center side management server 6 having at least a construction which a general information processing apparatus has is

provided as a center side apparatus for supervising monitoring of the devices. Further, there exist a database 11 for accumulating information, and the center side client PC 7 which is connected to the center side management server 6 via the LAN 9, and is operable independently or as a client of the center side management server 6. The center side management server 6 and the terminal side management server 2 are capable of communicating with each other via the communication line 8 such as the Internet using the predetermined communication protocol 10. In the example, a general protocol (such as SMTP (Simple Mail Transfer Protocol)) and an authentication are also provided for preventing unauthorized access and getting over (passing through) a firewall provided on the network. It should be noted that although only one center side management server 6 is provided in the illustrated example, in the example it may be assumed that a center side management servers 6 can be divided and a plurality of them can be provided depending on intended purposes such as failure monitoring and counter information collection as described later.

[0011]

On the other hand, on the terminal side of the device remote monitoring system, the terminal side management server 2 exists, and the monitoring apparatus 1 is connected to the LAN 9, for collecting

information from the devices 3, 4, and 5 and personal computers, not shown. The monitoring apparatus 1 has a function of collecting maintenance information including operative information and failure information on the various devices 3, 4, and 5 with which the monitoring apparatus 1 can communicate via the LAN 9, a function of providing control to update control programs and the like for the devices 3, 4, and 5, and a function of transferring the collected information to the center side management server 6 via the terminal side management server 2.

[0012]

It should be noted that insofar as information can be shared between the monitoring apparatus 1 and the terminal side management server 2, and between the center side client PC 7 and the center side management server 6, these apparatuses may be provided as independent apparatuses as in the present embodiment, or may be provided as single apparatuses having the respective functions of the apparatuses (a single apparatus having the respective functions of the monitoring apparatus 1 and the terminal side management server 2, and a single apparatus having the respective functions of the center side client PC 7 and the center side management server 6). This alternative arrangement is shown by two-dot chain lines in FIG. 1. In the following description, it is assumed that the

monitoring apparatus 1 communicates with the external center side management server 6 via the terminal side management server 2, but the terminal side management server 2 may also have the functions of the monitoring apparatus 1. In the following description, it is assumed that the monitoring apparatus 1 and the center side management server 2 transmit and receive information between them.

[0013]

Although only one monitoring apparatus 1 and only one terminal side management server 2 are shown in FIG. 1, in practice, the device remote monitoring system is constructed such that a plurality of monitoring apparatuses 1, a plurality of terminal side management servers 2, and the center side management server 6 which centrally manages these monitoring apparatuses 1 and terminal side management servers 2 communicate with each other via the communication line 8.

[0014]

Examples of the devices 3, 4, and 5 include a printer (such as an electrophotographic type printer or an ink jet type printer) as an image forming apparatus, a scanner as an image reading apparatus, a facsimile as an image communication apparatus, a digital multifunction apparatus as an image forming apparatus having a printer function and a facsimile function, a personal computer as an information processing

apparatus, and a print server as an image processing apparatus. The image forming apparatus will be described later in further detail. Further, personal computers, not shown, are connected to the LAN 9 in the same manner as a computer 501 shown in FIG. 7, and have a function of generating PDL (Page Description Language) from predetermined application data, for example, via an OS (Operating System) or a printer driver, and then transmitting the generated PDL to the devices 3, 4, and 5 for output.

[0015]

The monitoring apparatus 1 collects maintenance information including at least operative information such as equipment statuses, the residual toner quantity, and the number of printed sheets counted for respective sheet sizes of the devices 3, 4, and 5 (such as a printer, a facsimile, and a multi-function machine), operative information including CPU status, memory utilization status, and usage of rental application programs of the personal computers, sheet jam information of the devices 3, 4, and 5 (such as a printer, and a multi-function machine), and various types of failure information including the number of restarts occurring in the personal computers.

[0016]

FIG. 2 is a block diagram showing the hardware construction of the monitoring apparatus 1. The

monitoring apparatus 1 is comprised of a CPU 201, a bus 202, a RAM 203, and a flash ROM 204, as well as a plurality of interfaces (hereinafter simply referred to as "I/F") for various applications, namely, network I/F (1) 205, network I/F (2) 206, a serial I/F 207, and a debug I/F 208, all of which are provided in an ordinary information processing apparatus.

[0017]

The CPU 201 controls the respective component parts independently and/or integrally, and carries out processes shown in flowcharts of FIGS. 3 to 6, 9, 15, and 16 according to programs stored in the flash ROM 204. The bus 202 is a common signal path for transmitting and receiving data between the components in FIG. 2. The RAM 203 is a storage means that can electrically store information and is also rewritable. The flash ROM 204 is a non-volatile storage means that is electrically rewritable, and can also maintain information without power supply. The network I/Fs 205 and 206 exchange information with external apparatuses via the network. The serial I/F 207 exchange information by RS-232C serial communication. The debug I/F 208 is a serial communication section used for a debug application.

25 [0018]

Although the monitoring apparatus 1 may be comprised of an input device such as a keyboard, a

display section, a display control section, and the like, the monitoring apparatus 1 permits its settings to be changed such that a PC carried by a service person, for example, is connected to the network I/F 5 205 or 206 of the monitoring apparatus 1 so that a configuration program stored within the monitoring apparatus 1 is started from the PC as described later. That is, this can dispense with the provision of the input device, display section, and display control 10 section, to thereby enable the monitoring apparatus 1 to be constructed at a low cost.

[0019]

It suffices that the terminal side management server 2, the personal computers, the center side 15 management server 6, and the center side client PC 7 appearing in FIG. 1 have the construction of an ordinary information processing apparatus, and detailed description thereof, therefore, is omitted.

[0020]

20 FIGS. 3 and 4 are flowcharts showing a device failure monitoring process carried out by the monitoring apparatus 1. In the following description, it is assumed that information is transmitted from the monitoring apparatus 1 to the terminal side management server 2, the center side management server 6 25 (hereinafter referred to as "the host"), or the center side client PC 7 using SMTP, and the monitoring

apparatus 1 receives information using POP (Post Office Protocol).

[0021]

In step S301 in FIG. 3, the monitoring apparatus 1
5 runs a failure information checking program for
checking for failure information of the devices to be
monitored, and carries out processing in steps S303 to
S307 for the devices to be monitored, thereby carrying
out failure information checking processing at time
10 intervals of one minute, for example. First, in the
step S303, the monitoring apparatus 1 accesses the
devices to be monitored via the LAN 9 to obtain failure
information. It is then determined in the step S304
whether or not failure information has been acquired in
15 the step S303, and if it is determined that failure
information has been acquired, and the process proceeds
to the step S305.

[0022]

In the step S305, the monitoring apparatus 1
20 transmits the failure information acquired in the step
S303 to the host. Then, in the step S306, the
monitoring apparatus 1 starts the response checking
program for waiting for a response from the host. On
the other hand, if the monitoring apparatus 1
25 determines in the step S304 that failure information
has not been acquired in the above step S303, the
process proceeds to the step S307. In the step S307,

the monitoring apparatus 1 waits for one minute for checking for failure information at time intervals of one minute.

[0023]

5 In step S302 in FIG. 4, after transmitting the failure information to the host in the above step S305, the monitoring apparatus 1 executes the response check program which is started in the step S306. In this mechanism, upon receipt of failure information from the
10 monitoring apparatus 1, the host transmits information acknowledging the reception of the failure information by e-mail (hereinafter simply referred to as "mail") to the monitoring apparatus 1. In the response check program, the monitoring apparatus 1 waits for a
15 response from the host for 30 minutes at the maximum while repeating processing in the steps S308 to S310 at time intervals of 30 seconds, for example, and transmits the failure information again to the host only once if the response has not been received in that
20 30-minute time period.

[0024]

 In the step S308, the monitoring apparatus 1 waits for 30 seconds so as to carry out the processing at the time intervals of 30 seconds. Then, in the step S309,
25 the monitoring apparatus 1 receives a mail from the host, and determines whether or not the received mail is a response mail response to the failure processing.

If it is determined in the step S310 that the received mail is the response mail response to the failure processing, the response checking program is terminated. On the other hand, if it is determined in the step S310
5 that the received mail is not the response mail response to the failure processing, the process returns to the step S308 unless more than 30 minutes have elapsed after the start of the response checking program, or proceeds to a step S311 otherwise.

10 [0025]

In the step S311, the monitoring apparatus 1 determines the number of times the monitoring apparatus 1 has transmitted the failure information to the host. If the failure information has already been re-
15 transmitted to the host, the process is terminated because only one re-transmission is allowed. On the other hand, if it is determined in the step S311 that the failure information has not yet been re-transmitted to the host, the monitoring apparatus 1 re-transmits
20 the failure information to the host in a step S312.

[0026]

FIGS. 5 and 6 are flow charts showing a counter information acquisition process in which the monitoring apparatus 1 collects counter information of the devices
25 3 to 5 and the personal computers. In the present embodiment, counter information refers to information including part or all of the above-mentioned

maintenance information of the devices 3 to 5 and the personal computers, and the counter information acquisition processes shown in the flow charts are carried out for each of the devices.

5 [0027]

In step S401 in FIG. 5, the monitoring apparatus 1 executes a counter information acquisition program for acquiring the counter information, to carry out the steps S403 to S405 for the devices to be monitored at
10 time intervals of 60 minutes, for example, thereby preparing for a request from the host for acquiring the counter information. First, in the step S403, the monitoring apparatus 1 acquires the counter information from the devices. Then, in the step S404, the
15 monitoring apparatus 1 stores the counter information acquired from the devices in the step S403 in the flash ROM 204 to prepare for the request from the host for the counter information. On this occasion, if the data format of the counter information acquired from the
20 devices is different from the data format of the counter information transmitted to the host, the data may be converted when the counter information is stored. Alternatively, this data conversion may be carried out when the host requests counter information. Then, in
25 the step S405, the monitoring apparatus 1 waits for 60 minutes before carrying out the same processing for counter information acquisition 60 minutes later.

[0028]

In step S402 in FIG. 6, the monitoring apparatus 1 starts a counter information transmission program for transmitting counter information in response to a request from the host for the counter information. The host requests the counter information by transmitting a mail including a counter information request command to the monitoring apparatus 1. In the counter information transmission program, a mail from the host is checked at time intervals of three minutes, for example, in preparation for a request for the counter information. In a step S405, the monitoring apparatus 1 checks for a request from the host for counter information. Then, if it is determined in a step S406 that the request for the counter information has not been given, the process proceeds to a step S410. If it is determined in the step S406 that the request for the counter information has been given, the process proceeds to a step S407.

[0029]

In the step S407, the monitoring apparatus 1 determines whether or not the counter information is stored by the counter information acquisition program in the above step S401. If it is determined that the counter information is stored, the monitoring apparatus 1 transmits the stored counter information to the host in a step S408. By execution of the counter information transmission process, the counter

information transmitted from the monitoring apparatus 1 to the host is shared by the center side client PC 7 as described above, so that an operator, for example, can refer to the counter information. On the other hand,
5 if it is determined in the step S407 that counter information is not stored, the monitoring apparatus 1 notifies the host that the counter information has not been collected. Then, in the step S410, the monitoring apparatus 1 waits for three minutes, for example, to
10 check for a request from the host for counter information at time intervals of three minutes.
[0030]

In this way, the device failure information monitoring processes described in FIGS. 3 and 4, and
15 the counter information acquisition processes described in FIGS. 5 and 6 make it possible to remotely and centrally manage the maintenance information of image forming apparatuses and devices such as personal computers used by the user.

20 [0031]

FIG. 7 is a block diagram showing an example of the construction of a controller that controls an entire image forming apparatus which is an example of the devices 3, 4, and 5 in FIG. 1. The controller of
25 the image forming apparatus is comprised of an original feeder control section 502, an image reader control section 503, an image signal control section 504, a

printer control section 505, an external I/F 506, a CPU circuit section 507, a sorter control section 513, a finisher control section 514, and a status detecting section 515. In the figure, reference numeral 511
5 denotes an operating section of the image forming apparatus; 512, a display section of the image forming apparatus; and 501, the computer 501 connected to the image forming apparatus via the LAN 9.
[0032]

10 The CPU circuit section 507 is comprised of a CPU, not shown, a ROM 508, a RAM 509, and a hard disc drive 510. The CPU controls, as a whole, the original feeder control section 502, the image reader control section 503, the image signal control section 504, the printer
15 control section 505, the external I/F 506, the operating section 511, the display section 512, the sorter control section 513, the finisher control section 514, and the status detection section 515 in accordance with control programs stored in the ROM 508.
20 The ROM 508 stores the control programs. The RAM 509 temporarily stores control data, and is also used as a working area for calculations required for the control. The hard disk drive 510 stores information required for the control programs, and information received from the
25 original feeder control section 502 through the status detection section 515.

[0033]

The original feeder control section 502 provides control to drive an original feeder, not shown, which automatically feeds an original set on an original stacking section to an original reading position
5 according to an instruction from the CPU circuit 507. The image reader control section 503 provides control to drive a scanner unit, not shown, which scans an original, an image sensor, not shown, which photoelectrically converts an optical image of the
10 original to an electric signal, and other like devices, thereby transmitting an analog image signal output from the image sensor to the image signal control section 504. The image signal control section 504 carries out various processing on a digital signal converted from
15 the analog image signal, thereby converting this digital signal to a video signal, and outputs the video signal to the printer control section 505. The processing by the image signal control section 504 is controlled by the CPU control circuit 507.

20 [0034]

The external I/F 506 carries out various kinds of processing on a digital image signal input from the computer 501 via the LAN 9 and a LAN interface, thereby converting the digital image signal to a video signal,
25 and outputs the video signal to the printer control section 505. In addition, the external I/F 506 communicates with the monitoring apparatus 1 via the

LAN 9 and the LAN interface, not shown. The printer control section 505 drives an exposure controller, not shown, which controls exposure of a photosensitive member based on the input video signal. The operating
5 section 511 includes a plurality of keys for setting various functions relating to the image formation, and a display for displaying information indicating settings, and so forth. The operating section 511 outputs key signals corresponding to operations of the
10 keys to the CPU circuit 507, and displays information corresponding to signals from the CPU circuit 507 on the display section 512.

[0035]

The sorter control section 513 provides control to
15 drive a sorter mechanism, not shown, for sorting sheets on which images have been formed. The finisher control section 514 provides control to drive a finisher mechanism, not shown, which carries out post processing on sheets, such as punching and stapling of sheets on
20 which images have been formed. The sorter control section 513 and the finisher control section 514 operate based on signals from the CPU circuit section 507 according to inputs from a user via the external I/F 506 or settings input from the operating section
25 511. The state detecting section 515 collects status information from the various blocks shown in FIG. 7, carries out detections such as abnormality detection,

carries out determinations based on the detection results, and notifies the CPU circuit section 507 of the determination results. According to this notification, the CPU circuit 507 displays
5 abnormalities on the display section 512, and notifies the computer 501 and the like of the abnormalities via the external I/F 506.
[0036]

FIG. 8 is a block diagram showing the software
10 construction of the image forming apparatus. The image forming apparatus carries out a task manager A-101, a sheet conveying section task group A-102, a sequence control task A-103, a communication task A-104, a management data generation task A-105, and a status
15 monitoring task A-106.
[0037]

The task manager A-101 manages a plurality of tasks concurrently. The sheet conveying section task group A-102 is a group of tasks which manage the
20 conveyance of originals and sheets on which images are to be formed. The sequence control task A-103 carries out management of the entire image forming apparatus. The communication task A-104 communicates with the monitoring apparatus 1.
25 [0038]

The management data generation task A-105 generates data for the remote management of the present

embodiment. The image forming apparatus counts the number of generations of the operation information for each sheet size, each processing mode, each sheet type, and each of black-and-white and color each time an
5 image forming operation is carried out. The counting of the number of generations of the operation information is carried out by the management data generation task A-105, and the resulting counts are stored in the storage section in the image forming
10 apparatus. In a similar manner, status information (failure information) relating to states such as jam, error, and alarm is stored in a predetermined data format in the storage section in the image forming apparatus. Further, there are provided counters
15 (component part counters) for respective sections of the image forming apparatus, that indicate replacement cycles of consumable components, and degrees of usage of the consumable components, and the counts obtained by execution of the management data generation task A-
20 105 are stored in the storage section in the image forming apparatus.

[0039]

The status monitoring task A-106 detects abnormalities (jams, errors, and alarms) in the image
25 forming apparatus, or detects status changes in predetermined devices, and when the status monitoring task A-106 detects an abnormality or a status change,

status information in a predetermine format is stored in the storage section in the image forming apparatus.

[0040]

FIG. 9 is a flow chart showing processing in a
5 mail receiving program in which the monitoring
apparatus 1 receives a mail including an instruction
from the host and performs processing in accordance
with the instruction. The mail receiving program is
scheduled and started at regular time intervals, and is
10 terminated upon receiving one mail from the host or
completing the receipt of all mails.

[0041]

In a step S701, the monitoring apparatus 1 checks
whether a mail has reached a mail server or not. If it
15 is found in the step S701 that no mail has reached the
mail server, the mail receiving program is terminated.
If it is found in the step S701 that a mail has reached
the mail server, the process proceeds to a step S702
wherein the monitoring apparatus 1 receives only one
20 mail onto the monitoring apparatus. Then, in a step
S703, it is determined whether or not the received mail
is a mail from the host. In the present embodiment,
the monitoring apparatus 1 recognizes a mail address of
the host, and hence determines whether or not the
25 received mail is one from the host according to whether
or not a sender's mail address is the same as the mail
address of the host.

[0042]

If it is determined in the step S703 that the received mail is not a mail from the host, the monitoring apparatus 1 determines that the received
5 mail is a junk mail and discards it. The process then returns to the step S701 wherein the monitoring apparatus 1 receives the next mail. If it is determined in the step S703 that the received mail is a mail from the host, the monitoring apparatus 1
10 interprets an instruction (request) from the host by decoding the mail. The process then proceeds to the step S704 wherein the monitoring apparatus 1 starts a processing program suitable for the instruction, and then the mail receiving process is terminated.

15 [0043]

In the present embodiment, a module updating and a version information acquisition, described later, are also carried out in accordance with instructions contained in mails from the host. The mails are
20 received by the mail receiving process, and an update command processing program (FIG. 11) and a version collecting processing program (FIG. 12) are started.

[0044]

FIG. 10 is a view showing the format of data
25 attached to a module update instruction command mail (e-mail) transmitted from the host. The data is comprised of an install shell script 801 and modules

(main body) 802 to be updated, and is compressed and encoded and attached to the module update instruction command mail. The install shell script 801 contains one or more commands executable by an operating system
5 in the monitoring apparatus 1, including a command for providing conditional starting control, and is stored as a file, and the stored file can be executed.

[0045]

The install shell script 801 includes commands for
10 pre-processing before installation, including a command for stopping a resident module and a command for stopping an update module; a copy command for storing the updated modules 802 in the monitoring apparatus 1; and commands for post-processing such as restart after
15 updating. It should be noted that the contents of the install shell script 801 differ according to attributes of the updated modules 802 (resident, nonresident, shared library, and so forth).

[0046]

20 FIG. 11 is a flow chart showing an update command process program which is started in step S704 when a mail including a module update instruction is received from the host by the mail receiving program of the monitoring apparatus 1 shown in the FIG. 9.

25 [0047]

In a step S901, the monitoring apparatus 1 decodes and decompresses a file, which is attached to the mail

received from the host, on the RAM 203, and takes out therefrom the above described data comprised of the install shell script 801 and the modules 802 in FIG. 10. Then, in a step S902, the monitoring apparatus 1 starts
5 the install shell script 801 to install the modules 802 (i.e. modules running in the monitoring apparatus 1 are updated to the modules 802).

[0048]

FIG. 12 is a flow chart showing a version
10 collecting process program which is started in step S704 when a mail including a version information acquiring instruction is received from the host by the mail receiving program of the monitoring apparatus 1 shown in the FIG. 9.

15 [0049]

In a step S1001, the monitoring apparatus 1 collects individual version information indicative of versions of respective modules (programs, shell scripts, libraries, and so forth) stored in the monitoring
20 apparatus 1 and entire version information indicative of the version of the monitoring apparatus as a whole, and generates data to be sent to the host by return mail. In the present embodiment, it is assumed that the return mail data is in text format, and is printed
25 into a format as shown in FIG. 13. Then, in step S1002, the monitoring apparatus 1 attaches the version information generated in the step S1001 as a file to a

mail, and sends it to the host.

[0050]

FIG. 13 is a view showing an example of a print out showing the version information generated by the version collecting process program described in FIG. 12. Numerical values in a middle field 1102 indicate versions of items and modules in a left-hand field 1101. It should be noted that the representation of each version is comprised of an all-item common format part (up to 1.0.00), which is followed by a free description part as needed. In the module updating process according to the present embodiment, whether or not modules have been successfully updated is automatically determined as described later. In making the determination, the versions of the respective modules are not taken into account, but only the value of "Software Version" on the first row is taken into account.

[0051]

FIG. 14 is a flow chart showing a process in which modules in monitoring apparatuses 1 managed by the host are collectively updated at the initiative of the host side including the center side management server 6. FIG. 15 is a view showing a screen before the start of an uploading process in a collective updating program which operates on the center side client PC 7 connected to the center side management server 6, for carrying

out the collective updating process.

[0052]

A list of managed monitoring apparatuses 1 which are subject to update is displayed in a window 1301.

5 Although not shown in detail, a function of deleting/adding a monitoring apparatus 1 which is subject to processing from/to the list is provided so as to cope with the case where modules within all the managed monitoring apparatuses 1 are not updated in the

10 same manner. Reference numeral 1302 indicates a present software version of each monitoring apparatus 1. Reference numeral 1303 indicates a date on which the latest version information was acquired from each monitoring apparatus 1. In the present embodiment,

15 version information is necessarily acquired after each monitoring apparatus 1 is installed or after modules in each monitoring apparatus 1 are updated, and hence versions and dates indicated by 1302 and 1303, respectively, are the latest information on the

20 respective monitoring apparatuses 1. Reference numeral 1304 indicates a value indicative of a software version to which modules in each monitoring apparatus 1 are to be updated.

[0053]

25 In a step S1201, the host produces an attachment file for module update described with reference to FIG. 10. Then, in a step S1203, the host transmits a mail

which contains a module updating instruction and to which is attached the attachment file for update produced in the step S1201 to all the managed monitoring apparatuses 1 which are subject to processing. In a step S1202, the host determines whether processing in the step S1203 has been completed for all the monitoring apparatuses 1 which are subject to processing.

[0054]

10 Next, in a step S1205, the host transmits a mail including a version information acquiring instruction to all the managed monitoring apparatuses 1 which are subject to processing. In a step S1204, the host determines whether processing in the step S1205 has
15 been performed for all the monitoring apparatuses 1 which are subject to processing. It should be noted that the version information acquiring process is intended for acquiring the status of each monitoring apparatus 1 after update processing. Therefore, the
20 version information acquiring process has to be carried out upon the lapse of a sufficient period of time within which each monitoring apparatus 1 receives a mail including an updating instruction and completes update. This sufficient period of time differs
25 according to modules since pre-processing and post-processing for update are different.

[0055]

Next, in steps S1206 to S1210, the host ascertains whether modules within each monitoring apparatus 1 have been successfully updated or not. Specifically, in the step S1206, the host determines whether processing in
5 the steps S1207 to S1210 has been performed for all the monitoring apparatuses 1 which are subject to processing. If it is found in the step S1207 that there is no reply to the version information acquisition request transmitted in the step S1205, it
10 is impossible to determine whether modules have been successfully updated or not, and hence it is considered as a failure in update. The process then proceeds to the step S1210. If it is found in the step S1207 that there is a reply to the version information acquisition
15 request transmitted in the step S1205, the process proceeds to the step S1208.

[0056]

In the step S1208, the host compares the value of a software version ("Software Version" in FIG. 13) in
20 the acquired information with a software version 1304 (FIG. 15) which should be taken after update. If as a result of the comparison in the step S1208, it is determined in the step S1209 that modules have been successfully updated, the process returns to the step
25 S1206, and then the host performs processing on the next monitoring apparatus 1 which is subject to processing. If as a result of the comparison in the

step S1208, it is determined in the step S1209 that modules have not been successfully updated, the process proceeds to the step S1210. In the step S1210, to cope with the failure in update, the host stores information
5 identifying the monitoring apparatus 1 whose modules have not been successfully updated.

[0057]

FIG. 16 is a view showing a screen displayed on the center side client PC 7 shown in FIG. 15 after the
10 process in FIG. 14 is carried out for all the monitoring apparatuses 1 which are subject to processing. In a window 1401, reference numeral 1402 indicates versions after update obtained in the step S1205, and reference numeral 1403 indicates dates on
15 which version information was acquired in the step S1205. The monitoring apparatuses 1 which has failed in uploading and for which the step S1210 has been executed are checked off in a field indicated by reference numeral 1405 to clearly indicate a failure in
20 update. The present software version 1402 of these monitoring apparatuses 1 is different from the software version 1404 which should be taken after update.

[0058]

Although in the present embodiment, a failure in
25 uploading is only indicated in the window 1401 in FIG. 16, the present invention is not limited to this, but update for a corresponding monitoring apparatus 1 may

be automatically retried according to information
(information identifying the monitoring apparatuses 1
which has failed in uploading) stored in the step S1210.
[0059]

5 As described above, according to the present
embodiment, when receiving a module update instructing
mail from the host (the center side management server
6), the monitoring apparatus updates running modules to
received modules, and when receiving a version
10 information acquisition requesting mail from the host,
the monitoring apparatus collects version information
and sends the collected version information to the host
by return mail. Therefore, it is possible to
efficiently update modules within the monitoring
15 apparatus by remote control from the host. This
eliminates the necessity of carrying out such a
complicated operation that the host connects to the
monitoring apparatuses one by one to update modules
therein as in the prior art.

20 [0060]

Further, the host collectively transmits a module
update instructing mail including at least modules to
be updated and an install shell script to the
monitoring apparatuses, and collectively transmits a
25 version information acquisition requesting mail for
requesting acquisition of individual version
information indicative of respective versions of

modules in each monitoring apparatus and entire version information indicative of the version of each monitoring apparatus as a whole to the monitoring apparatuses. The host receives the version information
5 as a reply from each monitoring apparatus. Therefore, it is possible to remotely and collectively update modules in a plurality of monitoring apparatuses managed by the host. This eliminates the necessity of carrying out such a complicated and a large volume of
10 operation that the host connects to the monitoring apparatuses one by one and update modules therein as in the prior art.

[0061]

Further, after giving an instruction for updating
15 modules, the host gives an instruction for acquiring version information and acquires version information, and compares a version to which the modules should be updated with the acquired version information to ascertain whether the modules have been successfully
20 updated or not. Therefore, the host can automatically determine whether modules in each monitoring apparatus managed by remote control have been successfully updated or not. As a result, it is possible to properly manage the status of update in each monitoring
25 apparatus.

[0062]

[Other Embodiments]

Although in the above described embodiment, the device remote monitoring system is constructed as shown in FIG. 1, the present invention is not limited to this, but the numbers of monitoring apparatuses, center side
5 management servers, terminal side management servers, devices, and so forth to be installed, the network arrangement, and the types of devices to be monitored may be arbitrarily determined.

[0063]

10 Further, the object of the present invention may also be accomplished by supplying a system or an apparatus with a storage medium in which a program code of software, which realizes the functions of the embodiment is stored, and causing a computer (or CPU or
15 MPU) of the system or apparatus to read out and execute the program code stored in the storage medium.

[0064]

In this case, the program code itself read from the storage medium realizes the functions of the above
20 described embodiment, and hence a storage medium on which the program code is stored constitute the present invention.

[0065]

Examples of the storage medium for supplying the
25 program code include a floppy (registered trademark) disk, a hard disk, a magneto optical disk, a CD-ROM, a CD-R, a CD-RW, a DVD-ROM, a DVD-RAM, a DVD-RW, a DVD+RW,

a magnetic tape, a nonvolatile memory card, and a ROM.
[0066]

Further, the functions of the above described embodiment may be accomplished not only by executing
5 the program code read out by a computer, but also by causing an OS (operating system) or the like which operates on the computer to perform a part or all of the actual operations based on instructions of the program code.

10 [0067]

Further, the functions of the above described embodiment thereof may be accomplished by writing the program code read out from the storage medium into a memory provided in an expansion board inserted into a
15 computer or a memory provided in an expansion unit connected to the computer and then causing a CPU or the like provided in the expansion board or the expansion unit to perform a part or all of the actual operations based on instructions of the program code.

20 [0068]

[Exemplary Implementations]

Implementations of the present invention will now be listed.

[0069]

25 [Implementation 1]

A device monitoring apparatus capable of acquiring information by communication from a device to be

monitored and communicating with a management apparatus, characterized in that the device monitoring apparatus comprises:

a processing means for, when updated modules are
5 received from the management apparatus, updating modules in operation to the received modules;

an information collecting means that collects version information when a version information acquisition request has been received from the
10 management apparatus; and

a returning means that sends the version information collected by said information collecting means to the management apparatus

wherein the device monitoring apparatus carries
15 out communication with the management apparatus by e-mail.

[0070]

[Implementation 2]

A device monitoring apparatus according to
20 Implementation 1, characterized in that the device monitoring apparatus further comprises a receiving means that receives an update instruction e-mail containing at least updated modules and an install script, and an acquisition request e-mail requesting
25 acquisition of the version information on respective ones of the modules in the device monitoring apparatus and the device monitoring apparatus as a whole, and

wherein said processing means activates the install script received by said receiving means, and updates the modules in operation to the modules received by said receiving means, and

5 said information collecting means collects the version information on respective ones of the modules in the device monitoring apparatus and the device monitoring apparatus as a whole in response to the request received by said receiving means, and

10 said returning means sends the version information collected by said information collecting means to the management apparatus by return e-mail.

[0071]

[Implementation 3]

15 A management apparatus capable of managing a plurality of device monitoring apparatuses that acquire information by communication from devices to be monitored, characterized in that the management apparatus comprises:

20 an instructing means that collectively instructs the device monitoring apparatuses to update modules;

 an acquisition requesting means that collectively gives a request for acquisition of version information; and

25 an acquisition means that acquires the version information from the device monitoring apparatuses.

[0072]

[Implementation 4]

A management apparatus according to Implementation 3, characterized in that the management apparatus carries out communication with the device monitoring apparatus by e-mail.

[0073]

[Implementation 5]

A management apparatus according to Implementation 3 or 4, characterized in that

10 said instructing means collectively transmits update instruction e-mails containing at least updated modules and an install script to the device monitoring apparatuses,

15 said acquisition requesting means collectively transmits acquisition request e-mails for requesting acquisition of the version information on respective ones of the modules in the device monitoring apparatus and the device monitoring apparatus as a whole, and

20 said acquisition means receives the version information from the device monitoring apparatuses as replies to the acquisition request by said acquisition requesting means.

[0074]

[Implementation 6]

25 A management apparatus according to any one of Implementations 3 to 5, characterized in that,

after an instruction for updating modules is given

by said instructing means, the request for acquisition of version information is carried out by said acquisition requesting means and the acquisition of version information is carried out by said acquisition
5 means, and

wherein the management apparatus comprises a determining means that compares versions to be taken after update with the version information acquired by said acquisition means to determine whether the modules
10 have been successfully updated.

[0075]

[Implementation 7]

A device remote monitoring system, characterized in that the device remote monitoring system comprise: a
15 device monitoring apparatus according to the Implementation 1 or 2; and a management apparatus according to any one of the Implementations 3 to 6, and

wherein the management apparatus manages a plurality of device monitoring apparatuses and monitors
20 devices from a remote location by communication with the device monitoring apparatuses.

[0076]

[Implementation 8]

An update processing method for a device
25 monitoring apparatus capable of acquiring information by communication from a device to be monitored and communicating with a management apparatus,

characterized in that the method comprises:

a processing step for, when updated modules are received from the management apparatus, updating modules in operation to the received modules;

5 a information collecting step for collecting version information when a version information acquisition request has been received from the management apparatus; and

a returning step for sending the version
10 information collected in said information collecting step to the management apparatus.

[0077]

[Implementation 9]

An update management method for a management
15 apparatus capable of managing a plurality of device monitoring apparatuses that acquire information by communication from devices to be monitored, characterized in that the method comprises:

an instructing step for collectively instructing
20 the device monitoring apparatuses to update modules;

an acquisition requesting step for collectively giving a request for acquisition of version information; and

an acquisition step for acquiring the version
25 information from the device monitoring apparatuses.

[0078]

[Implementation 10]

A program applied to a device monitoring apparatus capable of acquiring information by communication from a device to be monitored and communicating with a management apparatus, characterized in that the program
5 causes a computer to execute:

a processing function for, when updated modules are received from the management apparatus, updating modules in operation to the received modules;

a information collecting function for collecting
10 version information when a version information acquisition request has been received from the management apparatus; and

a returning function for sending the version information collected by said information collecting
15 function to the management apparatus.

[0079]

[Implementation 11]

A program applied to a management apparatus capable of managing a plurality of device monitoring
20 apparatuses that acquire information by communication from devices to be monitored, characterized in that the program causes a computer to execute:

an instructing function for collectively
instructing the device monitoring apparatuses to update
25 modules;

an acquisition requesting function for
collectively giving a request for acquisition of

version information; and

an acquisition function for acquiring the version information from the device monitoring apparatuses.

[0080]

5 [Implementation 12]

A computer readable storage medium in which a program is stored, the program executing an update processing method for a device monitoring apparatus capable of acquiring information by communication from
10 a device to be monitored and communicating with a management apparatus, characterized in that the update processing method comprises:

a processing step for, when updated modules are received from the management apparatus, updating
15 modules in operation to the received modules;

a information collecting step for collecting version information when a version information acquisition request has been received from the management apparatus; and

20 a returning step for sending the version information collected in said information collecting step to the management apparatus.

[0081]

[Implementation 13]

25 A computer readable storage medium in which a program is stored, the program executing an update management method for a management apparatus capable of

managing a plurality of device monitoring apparatuses that acquire information by communication from devices to be monitored, characterized in that the update management method comprises:

- 5 an instructing step for collectively instructing the device monitoring apparatuses to update modules;
 an acquisition requesting step for collectively giving a request for acquisition of version information; and
- 10 an acquisition step for acquiring the version information from the device monitoring apparatuses.

[0082]

[Advantages of the Invention]

- As described above, according to the present
- 15 invention, when updated modules are received from the management apparatus, the device monitoring apparatus updates modules in operation to the received modules, and collects version information when a version information acquisition request has been received from
 - 20 the management apparatus and sends them to the management apparatus by return mail. Therefore, it is possible to efficiently update modules within the device monitoring apparatus by remote control from the management apparatus. This eliminates the necessity of
 - 25 carrying out such a complicated operation that the management apparatus connects to the monitoring apparatuses one by one to update modules therein as in

the prior art.

[Brief Description of the Drawings]

[FIG. 1] FIG. 1 is a diagram schematically showing an example of the entire construction of a device remote
5 monitoring system according to an embodiment of the present invention.

[FIG. 2] FIG. 2 is a block diagram showing the hardware construction of the monitoring apparatus.

[FIG. 3] FIG. 3 is a flow chart showing a device
10 failure monitoring process in the monitoring apparatus.

[FIG. 4] FIG. 4 is a flow chart continued from the flowchart in FIG 3.

[FIG. 5] FIG. 5 is a flow chart showing a counter information acquisition process in the monitoring
15 apparatus.

[FIG. 6] FIG. 6 is a flow chart continued from the flowchart in FIG. 5.

[FIG. 7] FIG. 7 is a block diagram showing the construction of a controller that controls the overall
20 operation of an entire image forming apparatus.

[FIG. 8] FIG. 8 is a diagram showing the software construction of the image forming apparatus.

[FIG. 9] FIG. 9 is a flow chart showing processing in a mail receiving program in the monitoring apparatus.

25 [FIG. 10] FIG. 10 is a diagram showing the format of data which is attached to a module update instruction command mail.

[FIG. 11] FIG. 11 is a flow chart showing processing in an update command process program in the monitoring apparatus.

[FIG. 12] FIG. 12 is a flow chart showing processing in
5 a version collecting process program in the monitoring apparatus.

[FIG. 13] FIG. 13 is a diagram showing an example of a printout showing version information generated in accordance with the version collecting program.

10 [FIG. 14] FIG. 14 is a flow chart showing processing in a collective updating program.

[FIG. 15] FIG. 15 is a view showing a screen before the start of an uploading process in the collective updating program.

15 [FIG. 16] FIG. 16 is a view showing a screen displaying the result of uploading of the collective updating program.

[Description of Symbols]

- 1 monitoring apparatus
- 20 2 terminal side management server
- 3, 4, 5 device
- 6 center side management server (instructing means, acquisition requesting means, acquisition means, determining means)
- 25 7 center side client PC
- 8 communication line
- 9 LAN

- 10 communication protocol
- 11 database
- 201 CPU (processing means, information collecting means)
- 5 205, 206 network I/F (returning means, receiving means)

[Title of the Document] Abstract

[Abstract]

[Problem to be Solved] To make it possible to efficiently update modules in the monitoring apparatus
5 by remote control from a management apparatus, or the like.

[Solution] When receiving a module update instructing mail from the center side management server 6, the monitoring apparatus 1 updates modules in operation to
10 the received modules, and when receiving a version information acquisition requesting mail from the center side management server 6, the monitoring apparatus 1 collects version information and sends them to the center side management server 6 by return mail. The
15 center side management server 6 collectively transmits module update instructing mails to the monitoring apparatuses, collectively transmits version information acquisition requesting mails for requesting acquisition of the version information on respective ones of the
20 modules in the monitoring apparatus and the monitoring apparatus as a whole, and receives the version information from the monitoring apparatuses as replies to the acquisition request.

[Selected Drawing] FIG. 1

FIG. 1

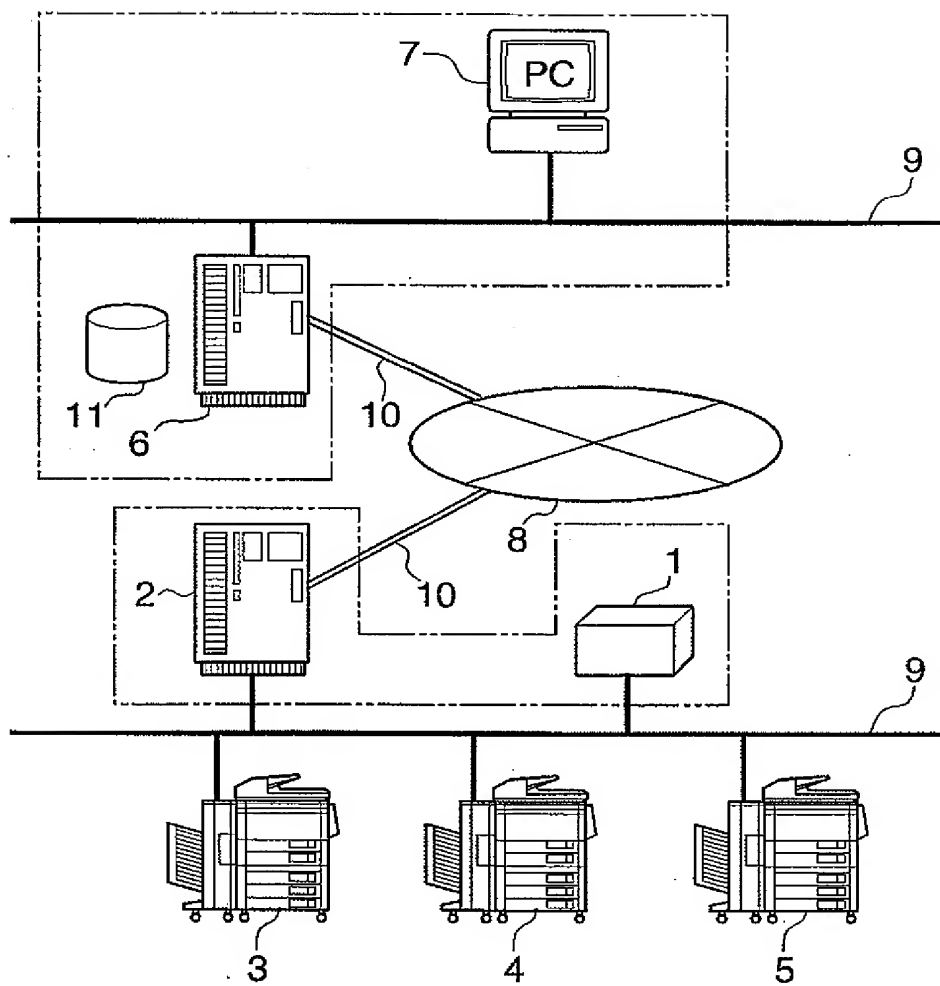


FIG.2

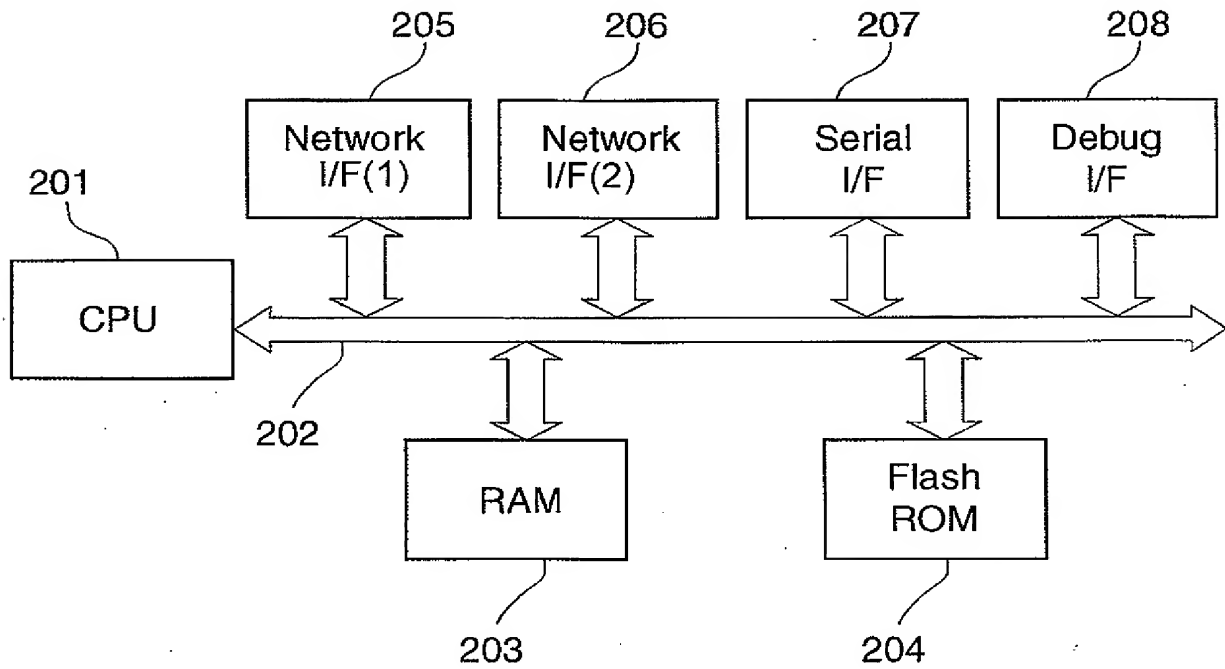


FIG. 3

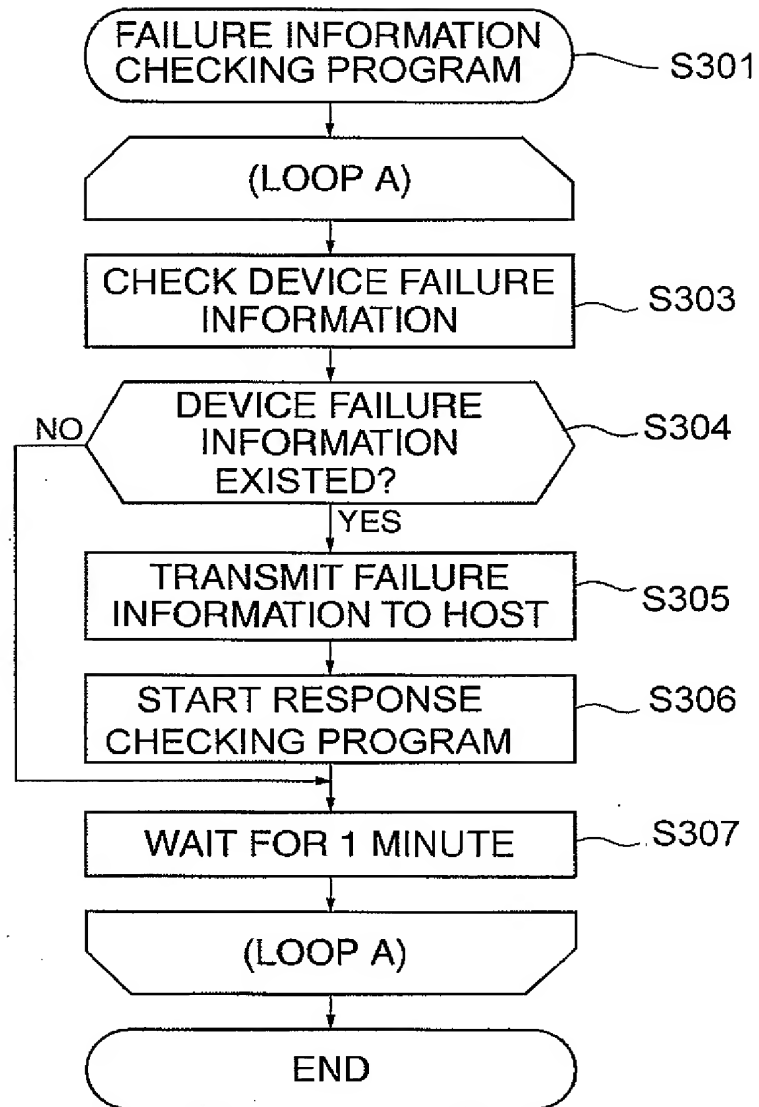


FIG. 4

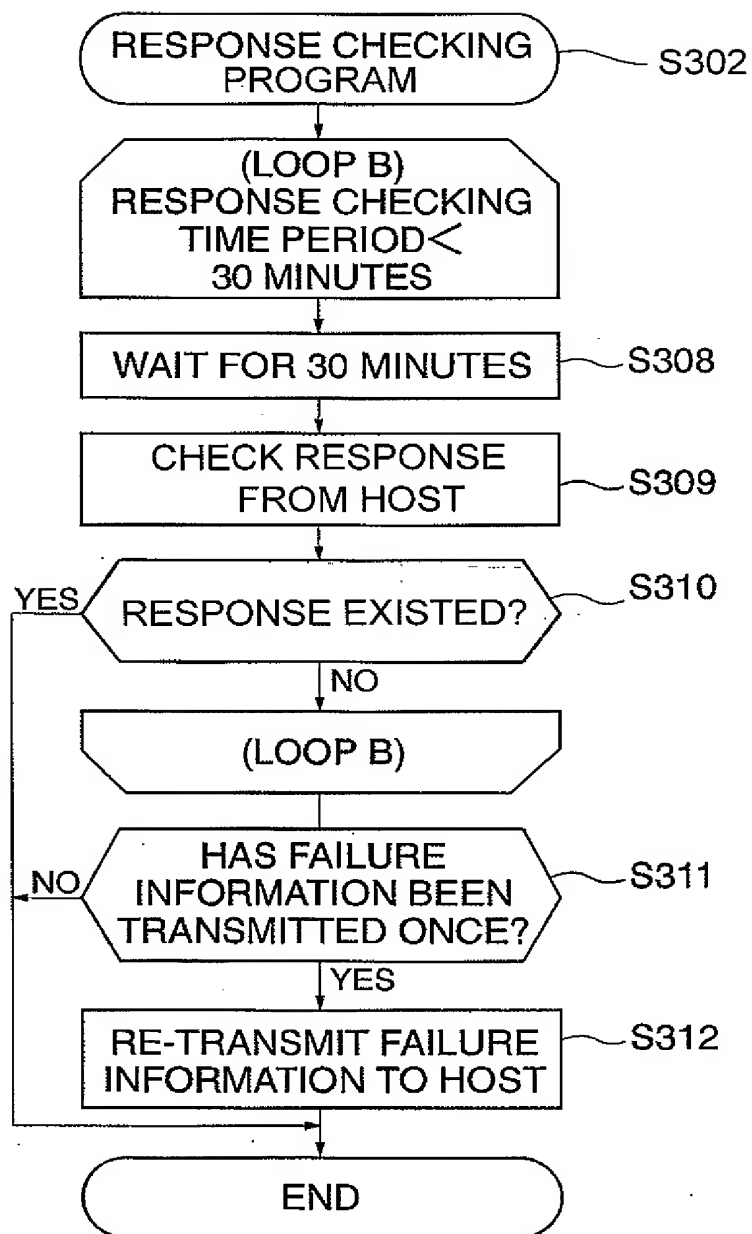


FIG. 5

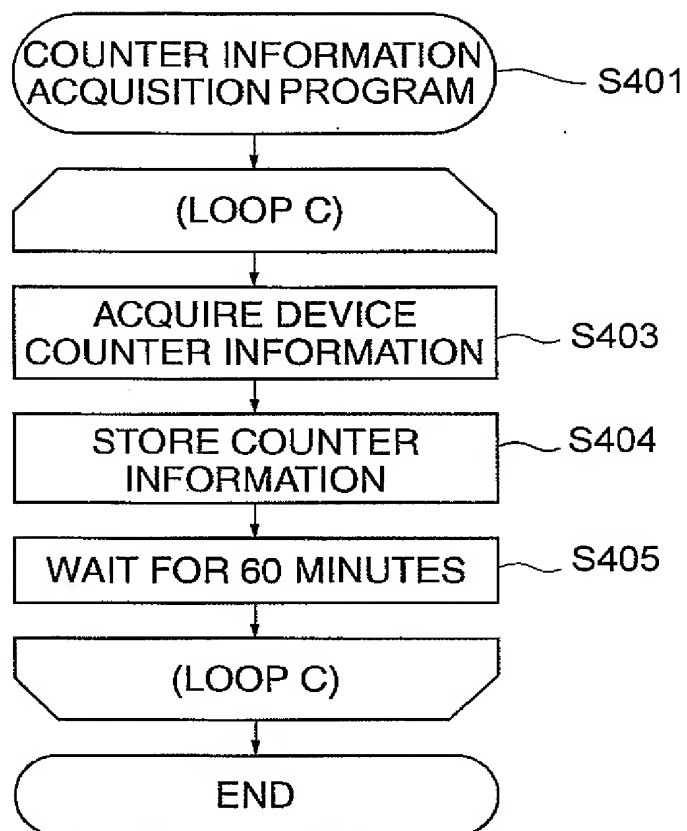


FIG. 6

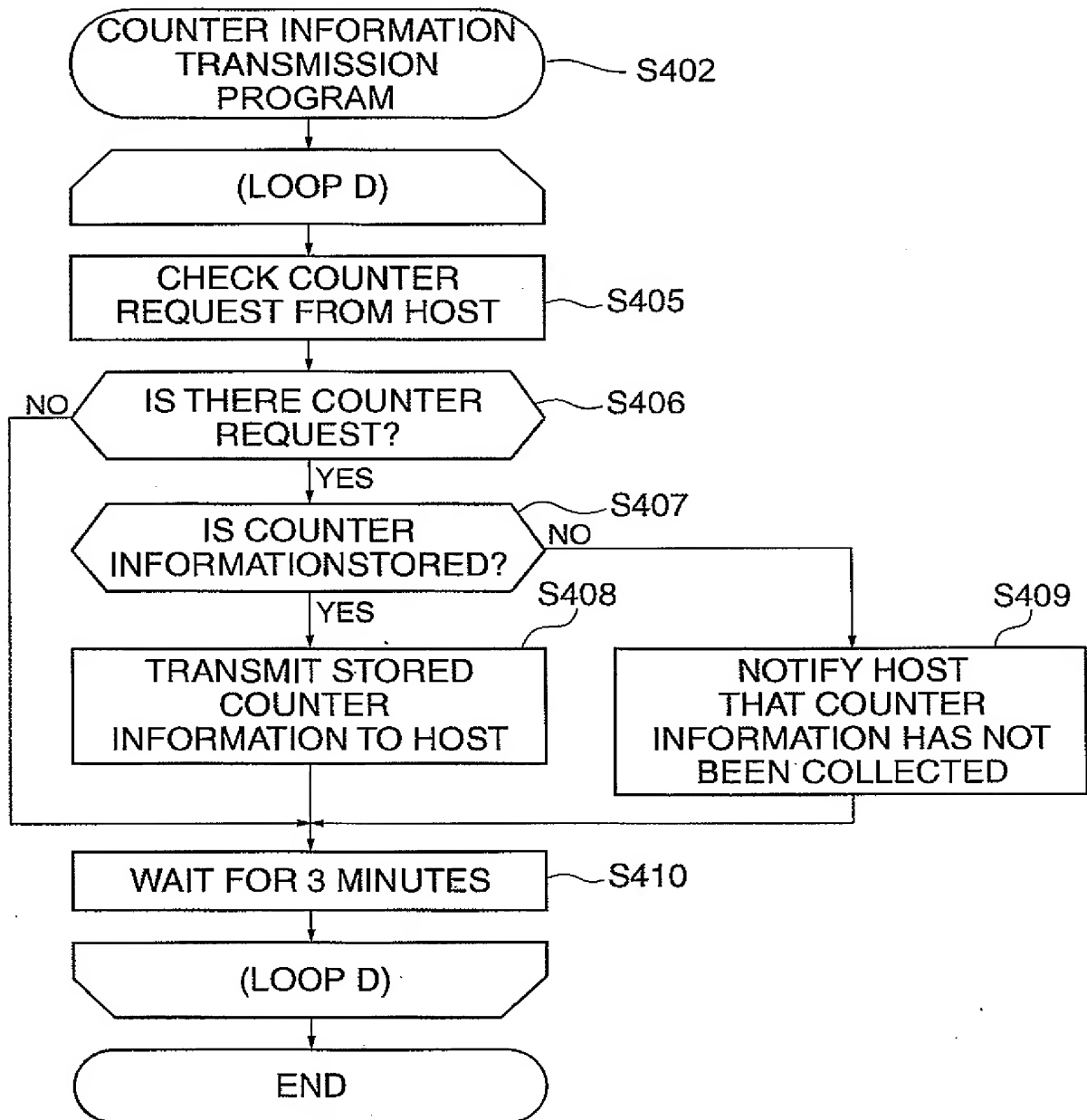


FIG. 7

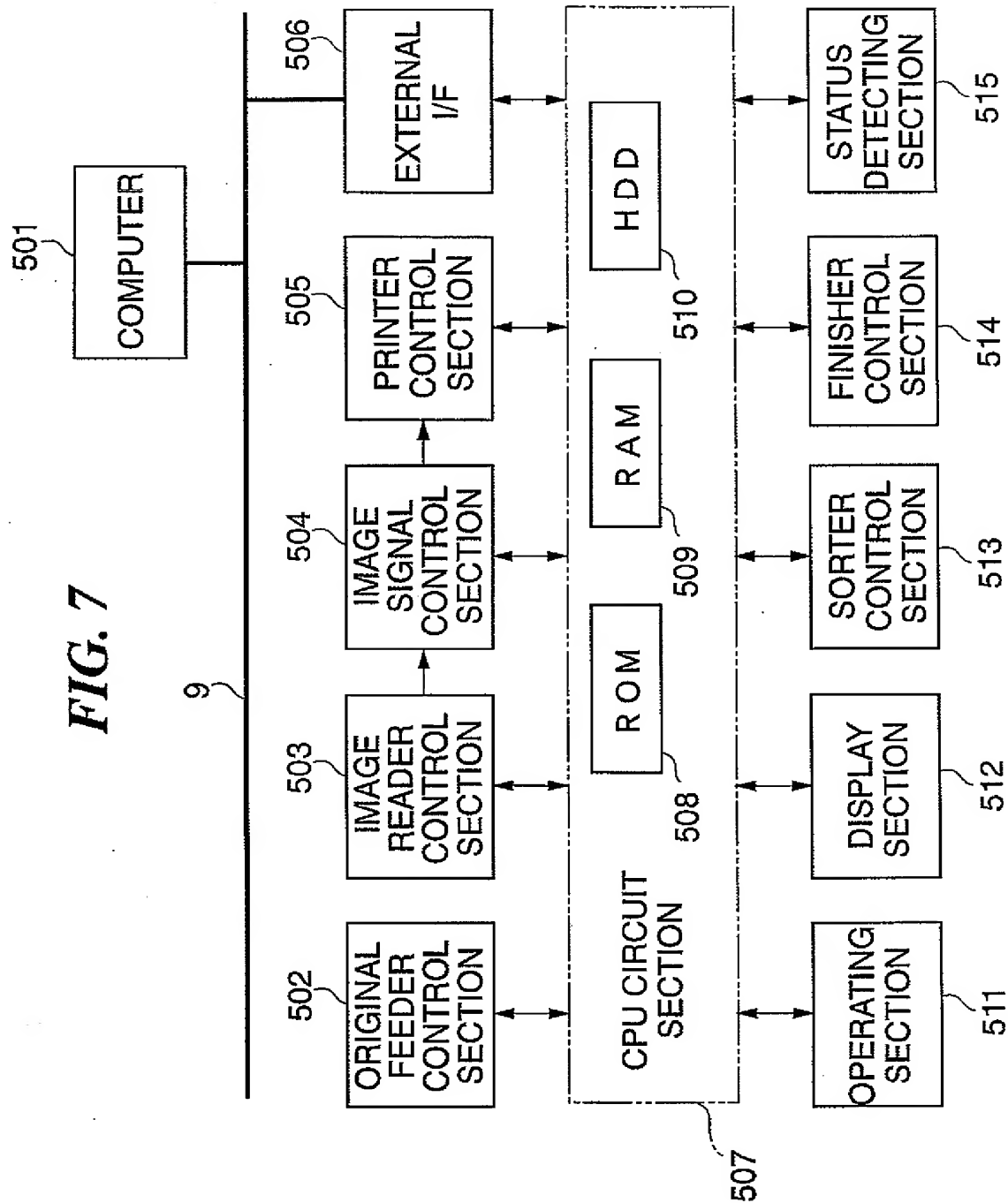


FIG. 8

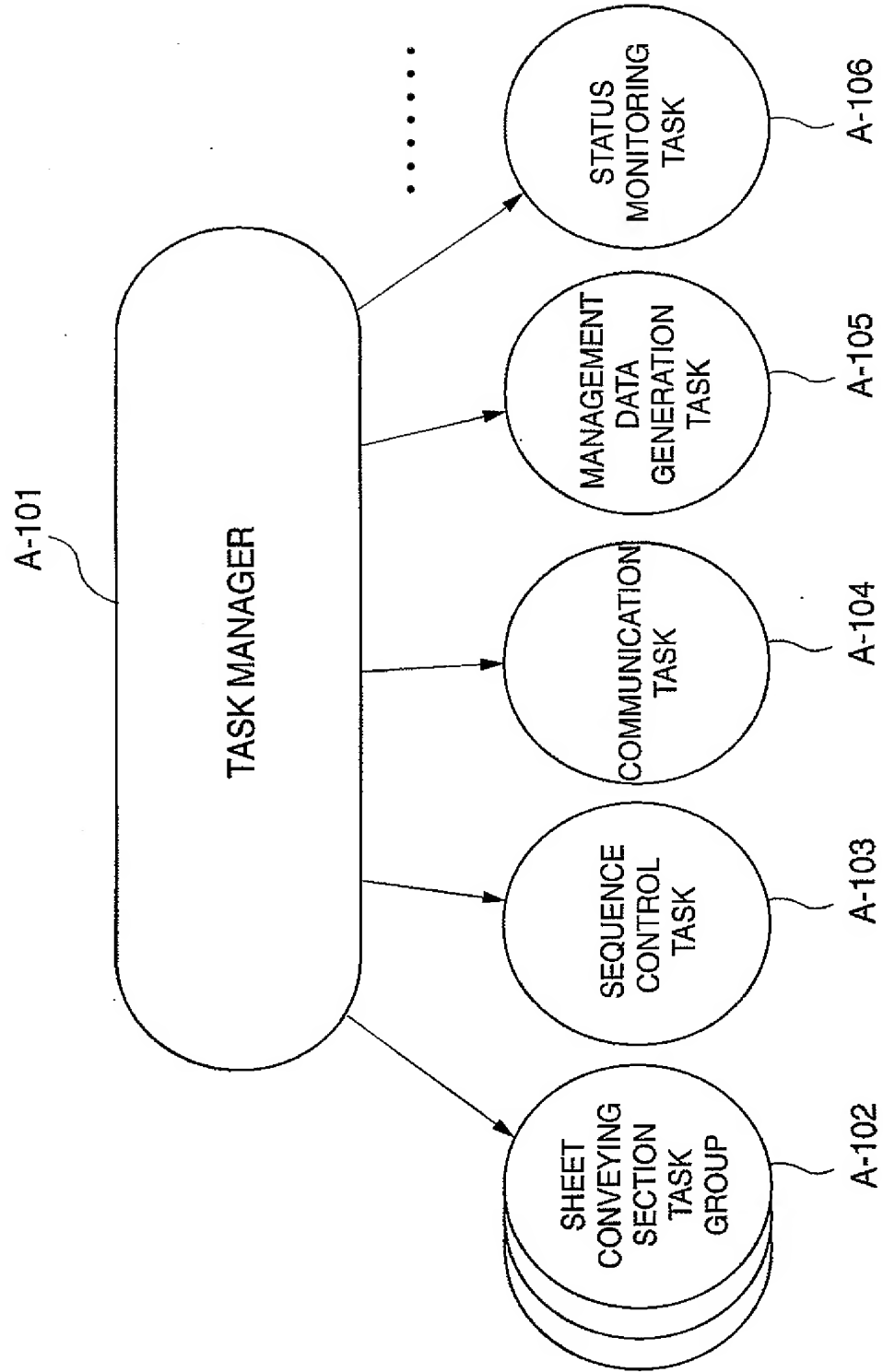


FIG. 9

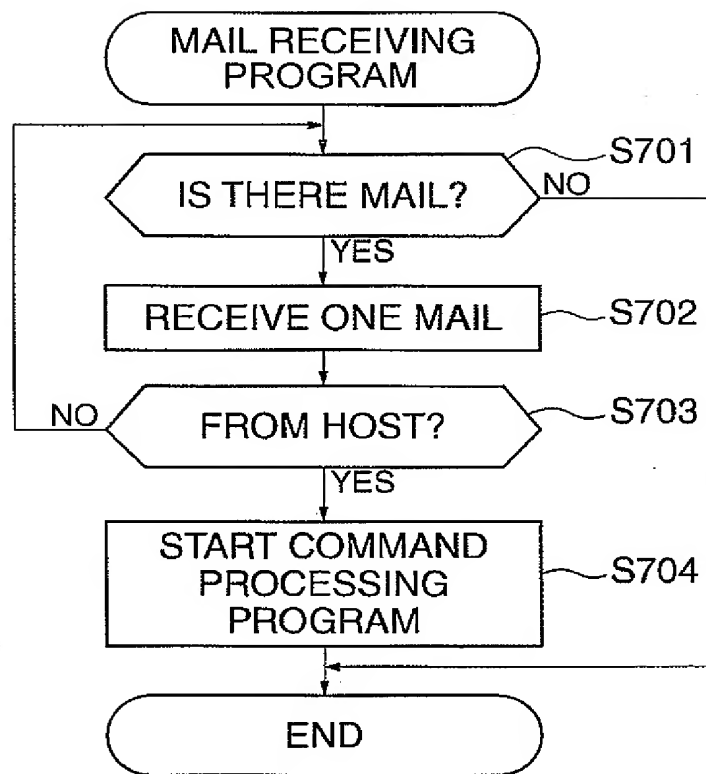


FIG. 10

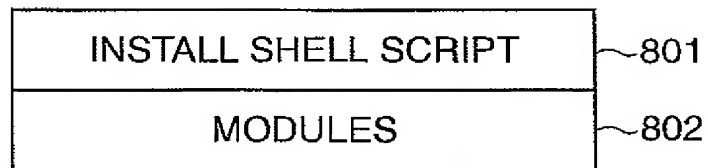


FIG. 11

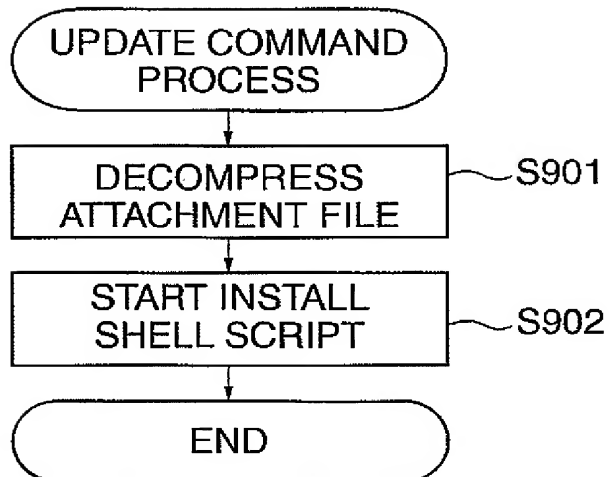


FIG. 12

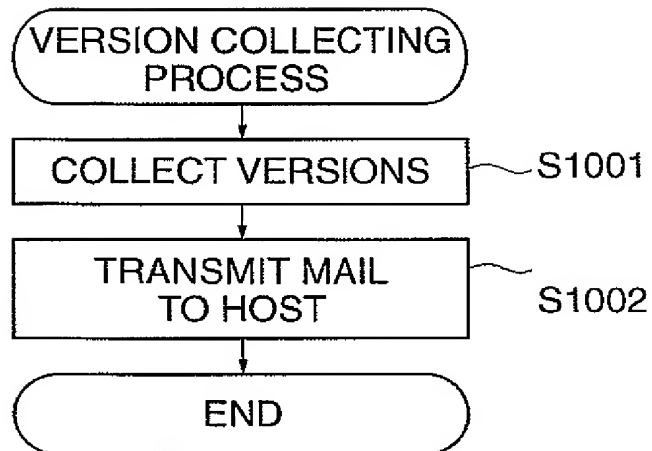


FIG. 13

1101		1102
Software Version	1.0.00-1	
ROM Version	1.5.08	
---Modules---		
abcd.exe	1.0.00	2002/01/01
bbb.lib	1.3.05	2002/11/29
main.cgi	1.0.00	2002/01/01
refresh	1.0.00	2002/01/01
agent_sweeprr	2.0.00	2002/08/07
time_shell.sh	1.1.01	2002/11/22
⋮		

FIG. 14

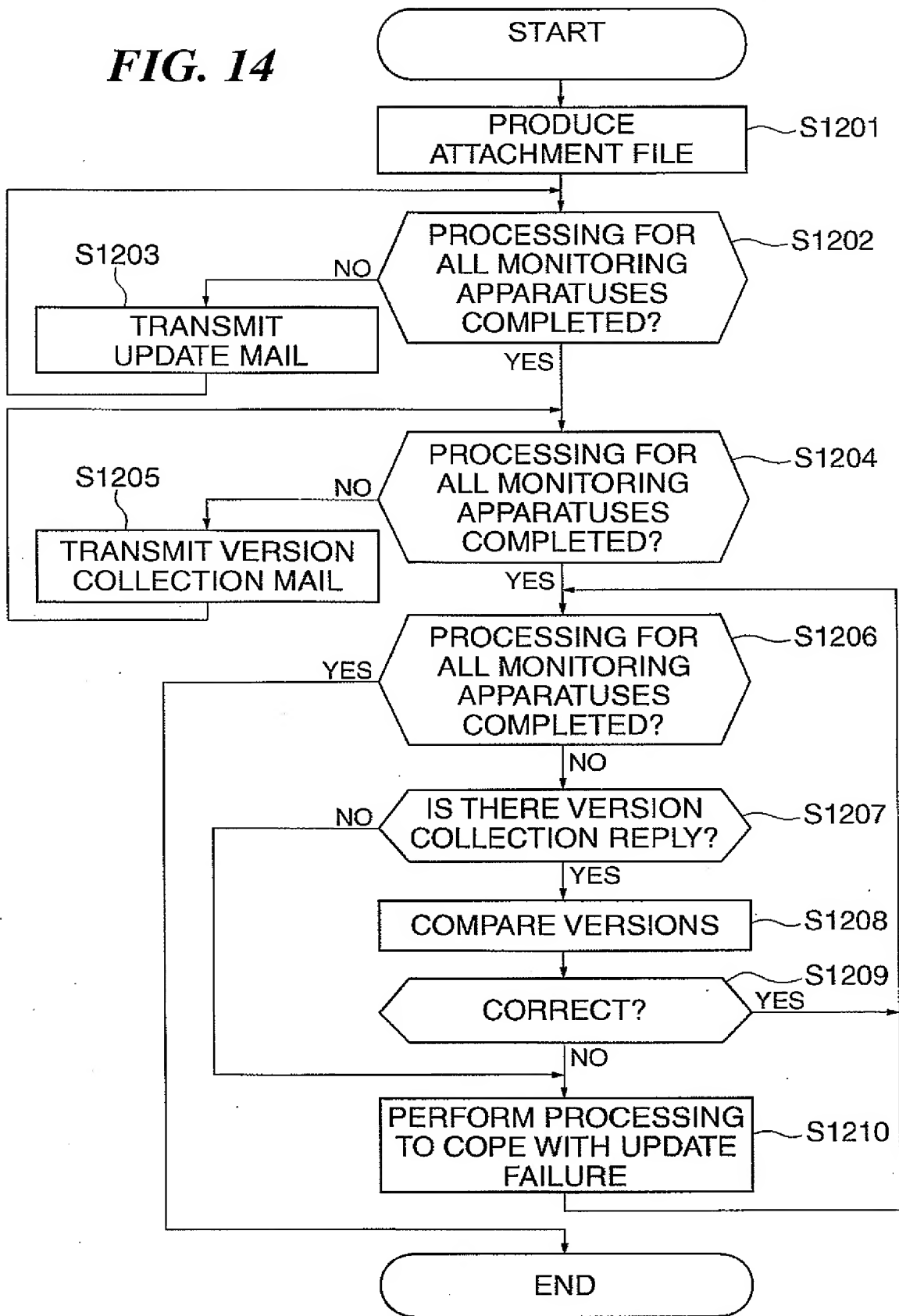


FIG.15

1301

1304

RDS Agent VersionManager				
FILE(F) COMMAND(C)				
update to : 1.0.02-0				
RDS Agent ID	MAIL ADDRESS	VERSION	DATE OF LATEST VERSION CHECK	REMARKS
AGENT00000001	agent@aaa.co.jp	1.0.00-1	02/11/03 15:25	aaa TRADING Co., Ltd.
AGENT00000002	agent@bbb.co.jp	1.0.00-1	02/11/03 15:26	bbb ELECTRIC Co., Ltd.
AGENT00000003	agent@ccc.co.jp	1.0.00-1	02/11/03 15:26	ccc INDUSTRY Co., Ltd.
AGENT00000004	agent@ddd.co.jp	1.0.00-1	02/11/03 15:26	ddd CONSTRUCTION Co., Ltd.
AGENT00000005	agent@eee.co.jp	1.0.00-1	02/11/03 15:26	eee BANK
AGENT00000006	agent@fff.co.jp	1.0.00-1	02/11/03 15:26	fff INSURANCE
AGENT00000007	agent@ggg.co.jp	1.0.00-1	02/11/03 15:26	ggg GENERAL INSURANCE
AGENT00000008	agent@hhh.co.jp	1.0.00-1	02/11/03 15:26	hhh FOUNDATION
AGENT00000009	agent@iii.co.jp	1.0.00-1	02/11/03 15:26	iii FOODS Co., Ltd.
AGENT00000010	agent@jjj.co.jp	1.0.02-1	02/11/03 15:26	jjj DEPARTMENT STORE
AGENT00000011	agent@kkk.co.jp	1.0.00-1	02/11/03 15:26	kkk COMMUNICATIONS (1F)
AGENT00000012	agent2@kkk.co.jp	1.0.00-1	02/11/03 15:26	kkk COMMUNICATIONS (2F)
AGENT00000013	agent3@kkk.co.jp	1.0.00-1	02/11/03 15:26	kkk COMMUNICATIONS (3F)
AGENT00000014	agent@lll.co.jp	1.0.00-1	02/11/03 15:26	lll MOTORS Co., Ltd.
AGENT00000015	agent@mmm.co.jp	1.0.01-1	02/11/03 15:26	mmm CITY CENTER (CITIZEN DEPARTMENT)
AGENT00000016	agent2@mmm.co.jp	1.0.01-1	02/11/03 15:26	mmm CITY CENTER(TAX PAYMENT DEPARTMENT)
AGENT00000017	agent@nnn.co.jp	1.0.00-1	02/11/03 15:26	nnn PLANNING Co., Ltd.

1302

1303

FIG.16

1401

1404

RDS Agent VersionManager
FILE(E) COMMAND(C)

update to : 1.0.02-0

RDS Agent ID	MAIL ADDRESS	VERSION	DATE OF LATEST VERSION CHECK	REMARKS
AGENT00000001	agent@aaa.co.jp	1.0.02-0	02/11/22 00:11	aaa TRADING Co., Ltd.
AGENT00000002	agent@bbb.co.jp	1.0.00-1	02/11/03 15:26	bbb ELECTRIC Co., Ltd.
AGENT00000003	agent@ccc.co.jp	1.0.02-0	02/11/22 00:32	ccc INDUSTRY Co., Ltd.
AGENT00000004	agent@ddd.co.jp	1.0.02-0	02/11/22 00:40	ddd CONSTRUCTION Co., Ltd.
AGENT00000005	agent@eee.co.jp	1.0.02-0	02/11/22 00:54	eee BANK
AGENT00000006	agent@fff.co.jp	1.0.02-0	02/11/22 01:01	fff INSURANCE
AGENT00000007	agent@ggg.co.jp	1.0.02-0	02/11/03 15:26	ggg GENERAL INSURANCE
AGENT00000008	agent@hhh.co.jp	1.0.02-0	02/11/22 01:12	hhh FOUNDATION
AGENT00000009	agent@iii.co.jp	1.0.02-0	02/11/22 00:18	iii FOODS Co., Ltd.
AGENT00000010	agent@jjj.co.jp	1.0.02-1	02/11/03 15:26	jjj DEPARTMENT STORE
AGENT00000011	agent@kkk.co.jp	1.0.02-0	02/11/22 00:33	kkk COMMUNICATIONS (1F)
AGENT00000012	agent2@kkk.co.jp	1.0.02-0	02/11/22 00:29	kkk COMMUNICATIONS (2F)
AGENT00000013	agent3@kkk.co.jp	1.0.02-0	02/11/22 00:47	kkk COMMUNICATIONS (3F)
AGENT00000014	agent@lll.co.jp	1.0.02-0	02/11/22 00:55	lll MOTORS Co., Ltd.
AGENT00000015	agent@mmm.co.jp	1.0.00-1	02/11/03 15:26	mmm CITY CENTER (CITIZEN DEPARTMENT)
AGENT00000016	agent2@mmm.co.jp	1.0.02-0	02/11/22 00:38	mmm CITY CENTER(TAX PAYMENT DEPARTMENT)
AGENT00000017	agent@nnn.co.jp	1.0.02-0	02/11/22 01:02	nnn PLANNING Co., Ltd.

1405

1402

1403